

NASA Advisory Council's Aeronautics Committee Report

**General Lester Lyles
July 20, 2006**

Topics to be addressed

- **Current Members/Replacement member**
- **National Research Council's Decadal Survey of Civil Aeronautics**
- **NASA Aeronautical Test Facilities**
- **Future Focus Areas**

Current Members/Replacement Member

- **Current Members**
 - **Chairman: Mr. Neil Armstrong**
 - **Members: General Lester L. Lyles, Dr. Eugene E. Covert; Dr. Raymond S. Colladay (ex-officio)**
- **Out-going member: Dr. Juan Alonso**
- **Replacement member**
 - **Brainstormed several names from Industry and Universities**
 - **The Aeronautics Committee will review the individual backgrounds and submit recommendations to the NAC Chair**

NRC Decadal Survey

- **Study was initiated when the ASEB noticed and became alarmed at the erosion of funding in NASA Aeronautics**
- **Dr. Lisa Porter requested that the foundation of the study be the 5 most needed advances in aeronautics**
- **The NRC could not identify 5 advances, but did identify the 5 most promising research areas and the effort was organized into 5 panels**
- **Each panel identified 4 main objectives and 2 auxiliary objectives**
- **The study culminated in 51 high priority R&T challenges, equally divided among the 6 objectives**
- **The 5 panels focused on**
 - **Aerodynamics and aeroacoustics**
 - **Propulsion and power**
 - **Materials & Structures**
 - **Dynamics, navigation and control, and avionics**
 - **Intelligent and autonomous systems, operations and decision making, human integrated systems, and networking and communications**

NRC Decadal Survey Recommendations

- 1. NASA should use the 51 highest priority R&T challenges as the foundation for the future of NASA's civil aeronautics research programs during the next decade**
- 2. The U.S. government should place a high priority on establishing a stable aeronautics R&T plan, with the expectations that the plan will receive more, as necessary, for activities that are demonstrating satisfactory progress**
- 3. NASA should use 5 common themes to make the most efficient use of civil aeronautics R&T resources:**
 - Physics-based analysis tools**
 - Multidisciplinary design tools**
 - Advanced configurations**
 - Intelligent and adaptive systems**
 - Complex interactive systems**

NRC Decadal Survey

Recommendations (continued)

- 4. NASA should support fundamental research to create the foundations for practical certification standards for new technologies**
- 5. The U.S. government should align organizational responsibilities as well as develop and implement techniques to improve change management for federal agencies and to assure a safe and cost-effective transition to the air transportation system of the future**
- 6. NASA should ensure that its civil aeronautics R&T plan features the substantive involvement of universities and industry, including a more balanced allocation of funding between in-house and external organizations than currently exists**

NRC Decadal Survey Recommendations

- 7. NASA should consult with non-NASA researchers to identify the most effective facilities and tools applicable to key aeronautics R&T projects and facilitate collaborative research to ensure that each project has access to the most appropriate research capabilities, including test facilities; computational models and facilities; and intellectual capital, available from NASA, FAA, DoD and other interested research organizations in government, industry and academia**
- 8. The U.S. government should conduct a high-level review of organizational options for ensuring U.S. leadership in civil aeronautics**

NRC Decadal Survey Conclusions

- **Dr. Lisa Porter said that the existing NASA program was pretty well aligned with the study recommendations**
- **There were a few areas of concern to the NRC**
 - **The balance between internal and external funding**
 - **with the external being cut short**
 - **The existing NASA Aeronautics Program was trying to fit 10 lbs in a 5 lb bag**
 - **Recommendation #8: The U.S. government should conduct a high-level review of organizational options for ensuring U.S. leadership in civil aeronautics; the need for a commission to determine the “how” of this recommendation**

NASA's Aeronautical Test Facilities

- **Presentation by Mr. Blair Gloss, Director of the Aeronautics Test Program**
- **Presentation by Dr. Phil Anton, RAND, Principal Investigator of RAND Facility Study in 2004**

U.S. Government Wind Tunnels

<u>Subsonic</u>	<u>Transonic</u>	<u>Supersonic</u>	<u>Hypersonic</u>
<ul style="list-style-type: none"> • LaRC 14x22 (1970) • LaRC Spin Tunnel (1940) • GRC Icing Tunnel (1944) • GRC 9x15 (1948/1968) • Navy 8x10#1 <hr/> <ul style="list-style-type: none"> • LaRC LTPT (1940) • ARC 12 Ft. (1996) <hr/> <ul style="list-style-type: none"> • LaRC 7x10 • ARC NFAC - Air Force fully responsible for ops. • LaRC 30x60 - ODU operating • ARC 7x10#1 - Army fully responsible for ops. • ARC 7x10 #2 • Navy 8x10#2 • Wright Labs SARL 7X10 • Wright Labs Spin Tunnel 	<ul style="list-style-type: none"> • ARC 11 Ft (1956) • LaRC TDT (1959) • LaRC NTF (1982) • LaRC 0.3M TCT (1973) • GRC 8x6 - Same drive as 9x15 (1948) • AEDC 4T (1968) • AEDC 16T (1952) <hr/> <ul style="list-style-type: none"> • LaRC 16 Ft. • LaRC 8 ft. TPT • ARC 14 ft • Navy 7x10 	<ul style="list-style-type: none"> • ARC 9x7 - Same drive as 11 Ft; (1956) • GRC 10x10 (1955) • LaRC Unitary 4x4 (1954) • AEDC APTU (1972) • AEDC VKF A (1954) <hr/> <ul style="list-style-type: none"> • AEDC 16S-same drive as 16T (1954) <hr/> <ul style="list-style-type: none"> • ARC 6x6 • ARC 8x7 - Same drive as 11 Ft. • Wright Labs TGF 	<ul style="list-style-type: none"> • LaRC 8 Ft. HTT (1964) • LaRC Hypersonic Complex (Early 60's) • AEDC Tunnel 9 (1976) • AEDC VKF B & C - Same drive as VKF A (1954) <hr/> <ul style="list-style-type: none"> • GRC HTF <hr/> <ul style="list-style-type: none"> • LaRC M17 He Quiet Tunnel • LaRC M6 Hi Re - Same drive as LaRC Hypersonic Complex • LaRC 60 inch M18 He • LaRC 29 inch M17 Nitrogen • ARC 3.5 ft • ARC 16 inch shock tunnel • Navy Tunnel 8 & 8A • Wright Labs 20" • Wright Labs Mach 6
<ul style="list-style-type: none"> • Green - Operational (Date Originally Built) • Mothballed or to be mothballed in FY07 • Red font - Closed since 1993 			

U.S. and European Facilities

U.S. Government Facilities

Subsonic

- LaRC 14x22 (1970)
- LaRC Spin Tunnel (1940)
- GRC Icing Tunnel (1944)
- GRC 9x15 (1948/1968)

Transonic

- ARC 11 Ft (1956)
- LaRC TDT (1959)
- LaRC NTF (1982)
- LaRC 0.3M TCT (1973)
- GRC 8x6 - Same drive as 9x15 (1948)
- AEDC 4T (1968)
- AEDC 16T (1952)

Supersonic

- ARC 9x7 - Same drive as 11 Ft; (1956)
- GRC 10x10 (1955)
- LaRC Unitary 4x4 (1954)
- AEDC APTU (1972)
- AEDC VKF A (1954)

Hypersonic

- LaRC 8 Ft. HTT (1964)
- LaRC Hypersonic Complex (Early 60's)
- AEDC Tunnel 9 (1976)
- AEDC VKF B & C - Same drive as VKF A (1954)

European Government Facilities*

Subsonic

- Icing Wind Tunnel - CIRA
- Low Speed Wind Tunnel - FFA
- LST - DNW
- NWB - DNW
- LLF - DNW
- KKK - DNW
- F1 - ONERA (DNW)
- 5M - QinetiQ (Boeing)

Transonic

- T1500 - FFA
- HST - DNW
- S1MA - ONERA (DNW)
- S2MA - ONERA (DNW)
- ETW

Supersonic

- SST - DNW
- TWG - DNW
- S3MA - ONERA (DNW)

Hypersonic

- RWK - DNW
- S4MA - ONERA (DNW)
- F4 - ONERA (DNW)

Red font: European Aero Testing Alliance - France, Netherlands and Germany

* Not a complete list - Does not include Russian facilities

Major Studies Related To NASA Wind Tunnels

- **1993 - The National Facility Study - NASA, DoD and Industry**
- **1994 - “Aeronautical Facilities - Assessing The National Plan For Aeronautical Ground Test Facilities”: The National Research Council**
- **1994 - “Test Capability Master Plan - Aero/Thermodynamic T&E Facilities Reliance”: DoD**
- **1995 - “Goals for a National Partnership in Aeronautical Research and Technology”: The National Science and Technology Council**
- **1996 - NASA/DoD Cooperation Study - Aeronautics and Astronautics Coordinating Board**
- **1997 - DoD Aeronautical Test Facilities Assessment Study**
- **2000 - “National Wind Tunnel Strategic Plan”: Report on 912c Wind Tunnel Study by DoD Test Environments Reliance Panel and NASA**
- **2001 - “Competitive Assessment of the U.S. Large Civil Aircraft Aerostructures Industry”: U.S. International Trade Commission**
- **2002 - Final Report of the Commission on the Future of the United States Aerospace Industry**
- **2004 - “Wind Tunnel and Propulsion Test Facilities - An Assessment of NASA’s Capabilities to Serve National Needs “: RAND**
- **2004 - “RDT&E Infrastructure Working Group”: National Science and Technology Council, Aeronautics Science and Technology Subcommittee**
- **2006 - “NASA Aeronautics Facilities Critical to DoD - Report to Congress”: Under Secretary of Defense (Acquisition, Science and Technology) - Fall 2006**

Goals Of Corporate Management Of Facilities

- **Increase the probability of having the right facilities in place at the right time for NASA's mission - over the long-term**
- **Operate those facilities in the most effective and efficient manner possible**
- **Ensure intelligent divestment of and investment in NASA's aeronautic test facilities as part of NASA's current and/or long-term mission**

Approach: Overview

- **Implement the Aeronautics Test Program (ATP)**
- **Begin with a subset of NASA's major research and test facilities; i.e., those facilities included in the NASA/DoD National Aeronautical Test Alliance**
- **Develop a reliance working relationship with DoD in the area of aeronautical test facilities**

ATP Activities

- **Providing resources to make the pricing of ATP facilities competitive**
- **Investing in large maintenance projects**
- **Developing and implementing test technology**
- **Supporting university research in NASA's major aeronautics facilities**
- **Developing and implementing a reliance working relationship with DoD with regards to aeronautics test facilities**

Future Facility Needs

- **Continued maintenance investments and upgrades**
- **Development of new test techniques that likely includes integration of computational capabilities with the testing**
- **The justified requirement for new test capability has not been identified at this point in time**
 - **New hypersonic test capability requirements may be justified in the future**

Future Focus Areas for the NAC Aeronautics Committee

- **Industry feels left out of current NASA Aeronautics program planning**
 - Committee to request a briefing from John Douglas of AIA before the next meeting
- **There is a concern over the backlog of maintenance and repair in the NASA Aeronautics test facilities**
- **There are a lot of other facilities and infrastructure not covered under the Aeronautics Test Program**
 - Committee recommends briefing by NASA's Strategic Capability Assets Program Manager to the full NAC
- **The Committee plans to look further into thermal protection systems**
 - At the molecular level and system end
 - High speed Russian torpedo
 - Materials basic research at AFRL